

## Development, Capabilities, and Impact on Wind Analyses of the Hurricane Imaging Radiometer (HIRAD)

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The Hurricane Imaging Radiometer (HIRAD) is a new airborne microwave remote sensor for hurricane observations that is currently under development by NASA Marshall Space Flight Center in partnership with the NOAA Atlantic Oceanographic and Meteorological Laboratory/Hurricane Research Division, the University of Central Florida, the University of Michigan, and the University of Alabama in Huntsville. The instrument is being test flown in January and is expected to participate in the tropical cyclone experiment GRIP (Genesis and Rapid Intensification Processes) in the 2010 season. HIRAD is being designed to study the wind field in some detail within strong hurricanes and to enhance the real-time airborne ocean surface winds observation capabilities of NOAA and USAF Weather Squadron hurricane hunter aircraft currently using the operational Stepped Frequency Microwave Radiometer (SFMR). Unlike SFMR, which measures wind speed and rain rate along the ground track at a single point directly beneath the aircraft, HIRAD will provide images of the surface wind and rain field over a wide swath ( $\sim 3 \times$  the aircraft altitude) with  $\sim 2$  km resolution. This paper describes the HIRAD instrument and the physical basis for its operations, including chamber test data from the instrument. The potential value of future HIRAD observations will be illustrated with a summary of Observing System Simulation Experiments (OSSEs) in which measurements from the new instrument as well as those from existing instruments (air, surface, and space-based) are simulated from the output of a detailed numerical model, and those results are used to construct simulated H\*Wind analyses. Evaluations will be presented on the impact on H\*Wind analyses of using the HIRAD instrument observations to replace those of the SFMR instrument, and also on the impact of a future satellite-based HIRAD in comparison to instruments with more limited capabilities for observing strong winds through heavy rain. Potential impact on numerical prediction of hurricane intensity will also be discussed.